Title

Dynamical Core in Atmospheric Model Does Matter in the Simulation of Arctic Climate

Presenters

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Abstract

Climate models using different dynamical cores can simulate significantly different winter Arctic climates even if equipped with virtually the same physics schemes. Current climate simulated by the global climate model using cubed-sphere grid with spectral element method (SE core) exhibited significantly warmer Arctic surface air temperature compared to that using latitude longitude grid with finite volume method core. Compared to the finite volume method core, SE core simulated additional adiabatic warming in the Arctic lower atmosphere, and this was consistent with the eddy-forced secondary circulation. Downward longwave radiation further enhanced Arctic near-surface warming with a higher surface air temperature of about 1.9 K. Furthermore, in the atmospheric response to the reduced sea ice conditions with the same physical settings, only the SE core showed a robust cooling response over North America. We emphasize that special attention is needed in selecting the dynamical core of climate models in the simulation of the Arctic climate and associated teleconnection patterns

Session Selection:

Arctic and midlatitude linkage: Causes and Effects